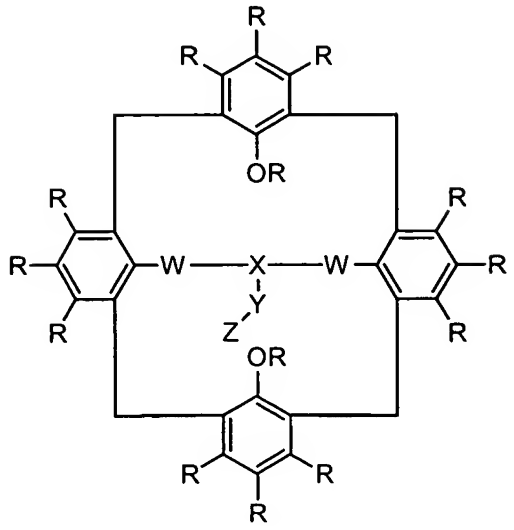
CLAIMS

We claim:

1. A compound, having the structure:



wherein,

(a) R is hydrogen, a saturated or unsaturated alkyl or aryl group, an ether, a carboxylic acid or ester group, or an alkyl or aryl group containing nitrogen or sulfur, independently or in combination;

(b) W is $-O(CH_2)_2-$;

(c) X is nitrogen, substituted or unsubstituted aryl, with or without heteroatoms, such as nitrogen, sulfur, oxygen, or saturated and unsaturated alkyl;

(d) Y is saturated or unsaturated alkyl or aryl, ether, carboxylic containing, nitrogen or sulfur independently or in combination; and

(e) Z is an unsubstituted aryl group or groups (a fluorophore or a chromophore).

2. The compound of claim 1, wherein Z is selected to obtain a negative, thermo-neutral or slightly positive free energy value from the Rehm-Weller equation for the compound.

3. The compound of claim 1, wherein the presence of Z in the compound allows for optical detection either through modulation of absorption and/or fluorescence.

4. The compound of claim 1, wherein Z is anthracene.

5. The compound of claim 1, wherein the compound is engaged to a support material.

6. The compound of claim 5, wherein the support material is a transparent support material.

7. The compound of claim 5 wherein the support material is Nafion.

8. The compound of claim 5 wherein the support material is a sol gel material.

9. The compound of claim 8 wherein the sol gel material is silicate.

10. The compound of claim 8 wherein the sol gel material is polyvinylformal-silica.

11. The compound of claim 5 wherein the support material is a plasticized poly(vinyl chloride) film.

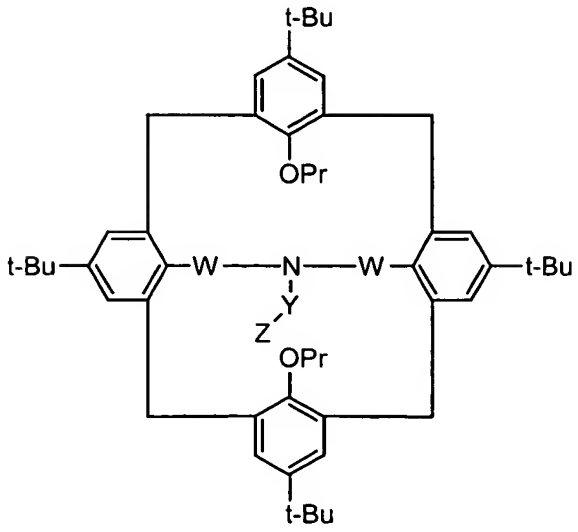
12. The compound of claim 11 wherein the plasticized poly(vinyl chloride) film is placed on an end of an optically conductive fiber.

13. The compound of claim 12 wherein the optically conductive fiber is connected directly to a spectrofluorimeter.

14. The compound of claim 1 wherein X is an oxygen moiety.

15. The compound of claim 14 wherein the compound comprises an ether crown bridge.

16. A compound, having the structure:



wherein,

(a) W is $-O(CH_2)_2-$;

(b) Y is $-CH_2-$; and

(c) Z is a fluorophore.

17. The compound of claim 16 wherein the fluorophore is anthracene.

18. The compound of claim 16 wherein Z is selected so that a negative, thermo-neutral or slightly positive free energy value is obtained from the Rehm-Weller equation for the compound.

19. The compound of claim 16, wherein the compound is engaged to a support material.

20. The compound of claim 19, wherein the support material is a transparent support material.

21. The compound of claim 19 wherein the support material is Nafion.

22. The compound of claim 19 wherein the support material is a sol gel material.

23. The compound of claim 22 wherein the sol gel material is silicate.

24. The compound of claim 22 wherein the sol gel material is polyvinylformal-silica.

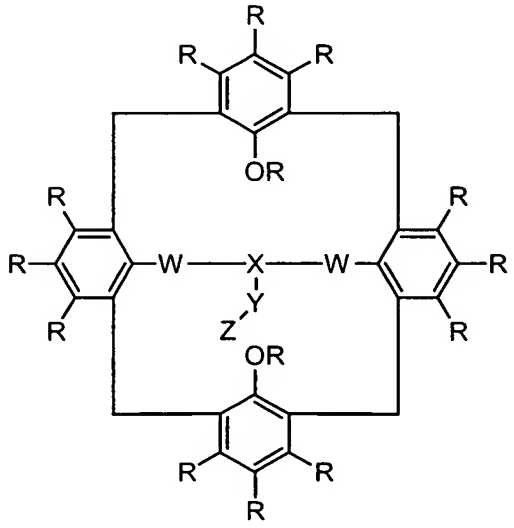
25. The compound of claim 19 wherein the support material is a plasticized poly(vinyl chloride) film.

26. The compound of claim 25 wherein the plasticized poly(vinyl chloride) film is placed on an end of an optically conductive fiber.

27. The compound of claim 26 wherein the optically conductive fiber is connected directly to a spectrofluorimeter.

28. A device for the detection of lithium ions, comprising:

a compound of the general formula:



wherein,

(a) R is hydrogen, a saturated or unsaturated alkyl or aryl group, an ether, a carboxylic acid or ester group, or an alkyl or aryl group containing nitrogen or sulfur, independently or in combination;

(b) W is $-O(CH_2)_2-$;

(c) X is nitrogen, substituted or unsubstituted aryl, with or without heteroatoms, such as nitrogen, sulfur, oxygen, or saturated and unsaturated alkyl;

(d) Y is saturated or unsaturated alkyl or aryl, ether, carboxylic containing, nitrogen or sulfur independently or in combination; and

(e) Z is an unsubstituted aryl group or groups (a fluorophore or a chromophore); and

a support material,

wherein the compound is engaged to the support material.

29. The device of claim 28, wherein Z is selected so that a negative, thermo-neutral or slightly positive free energy value is obtained from the Rehm-Weller equation for the compound.

30. The device of claim 28, wherein the presence of Z in the compound allows for optical detection either through modulation of absorption and/or fluorescence.

31. The device of claim 28, wherein the Z is anthracene.

32. The device of claim 28, wherein the support material is a transparent support material.

33. The device of claim 28 wherein the support material is Nafion.

34. The device of claim 28 wherein the support material is a sol gel material.

35. The device of claim 34 wherein the sol gel material is silicate.

36. The device of claim 34 wherein the sol gel material is polyvinylformal-silica.

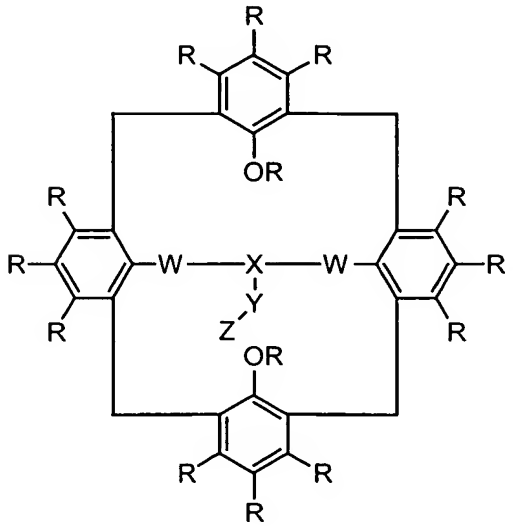
37. The device of claim 28 wherein the support material is a plasticized poly(vinyl chloride) film.

38. The device of claim 37 wherein the plasticized poly(vinyl chloride) film is placed on an end of an optically conductive fiber.

39. The device of claim 38 wherein the optically conductive fiber is connected directly to a spectrofluorimeter.

40. A method of determining lithium ion concentration of a biological fluid, comprising:

(i) providing a device comprising a compound of the structure:



wherein,

(a) R is hydrogen, a saturated or unsaturated alkyl or aryl group, an ether, a carboxylic acid or ester group, or an alkyl or aryl group containing nitrogen or sulfur, independently or in combination;

(b) W is $-O(CH_2)_2-$;

(c) X is nitrogen, substituted or unsubstituted aryl, with or without heteroatoms, such as nitrogen, sulfur, oxygen, or saturated and unsaturated alkyl;

(d) Y is saturated or unsaturated alkyl or aryl, ether, carboxylic containing, nitrogen or sulfur independently or in combination; and

(e) Z is a fluorophore;

(ii) placing the device into the biological fluid; and

(iii) measuring a signal, wherein the signal indicates a lithium ion concentration of the biological fluid.

41. The method of claim 40 wherein the device is an optical sensor.

42. The method of claim 40 wherein the device is an ion selective electrode.

43. The method of claim 40 wherein the signal is a fluorescence.

44. The method of claim 40 wherein the biological fluid is whole blood.

45. The method of claim 40 wherein the biological fluid is serum.

46. The method of claim 40 wherein the biological fluid is plasma.

47. The method of claim 40 wherein the biological fluid is cerebrospinal fluid.

48. The method of claim 40 wherein the biological fluid is urine.

49. The method of claim 40 wherein the biological fluid is amniotic fluid.

50. The method of claim 40 wherein the biological fluid is saliva.

51. The method of claim 40 wherein the biological fluid is tears.

52. The method of claim 40 wherein Z is anthracene.

53. The method of claim 40 wherein Z is selected so that a negative, thermo-neutral or slightly positive free energy value is obtained from the Rehm-Weller equation for the compound.